

PRELIMINARY MANUAL

LN-40'

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

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SECTION 1

SPECIFICATIONS - USING INTERNAL DETECTOR

1.1	INPUT IMPEDANCE	50 ohms
1.2	FREQUENCY RESPONSE	.3 MHz to 1000 MHz
1.3	VSWR	1.2 maximum at 1000 MHz
1.4	OUTPUT IMPEDANCE	200 ohm to 25K ohm depending upon amplitude control setting.
1.5	DYNAMIC RANGE	40 db at 0.5v rms maximum input
1.6	LINEARITY	Approximately 1 volt output change per 10 db input change. Linear to within 0.4 volts.
1.7	AMPLIFIER BANDWIDTH	Approximately 100 KHz
1.8	SIZE	5" X 3-1/2" X 2"
1.9	WEIGHT	20 ozs.
1.10	POWER	Two type 2U6, 9 volt batteries. Total current drain: 6 ma per battery. Operating battery life approximately 50 hours.
1.11	CONNECTORS	All Type BNC

SECTION 2

GENERAL DESCRIPTION

2.1 GENERAL INFORMATION

The LN-40 Logarithmic Amplifier is a solid state instrument employing monolithic integrated circuit operational amplifiers and a transistor to provide an output that is the logarithm of the input signal. The LN-40 has a built in detector and batteries to make it a versatile self-contained unit. This unit can also be used with an external detector.

The linear integrated circuits are incorporated for minimum drift and noise, and the low frequency circuits are assembled on high quality printed circuit boards for maximum reliability and serviceability.

The LN-40 covers the frequency range from .3MHz to 1000 MHz with the built in detector and is limited only by the upper frequency of an external detector - if one is used.

An output size control allows for attenuation of the output from the log amplifier with out affecting the log action. Also provided are two adjustments to establish the proper logarithmic response and a zero DC output with no input. The built in detector has a switchable time constant providing a ten times increase in the time constant in the slow position. The output from the LN-40 is positive going for a negative output from the detector.

2.2 INTRODUCTION

The block diagram of the LN-40, shown in figure 2-1, can be divided into 4 major sections: (1) The detector and switching, (2) the logarithmic amplifier, (3) the constant gain amplifier, and (4) power supply. The following paragraphs present a description of the details of each of these sections:

2.3 THE DETECTOR

The detector is housed in an aluminum block mounted on the panel of the unit. In the block is a 50 ohm termination resistor, R20, a diode CR1, and a feed thru capacitor C10. When an RF signal is fed into the detector RF Connector, the negative DC output is coupled into the log amplifier and is also present at the connector labeled DC enabling the detector to be used independent of the amplifier. If the internal/external switch is in the external position, the internal detector is disabled and an external negative detectors' DC output signal can be fed into the DC connector. When using the internal detector, the time constant or speed, can be changed with the fast/slow switch. The slow position switches C9 across the output of the detector effectively increasing the time constant by ten times.

2.4 THE LOG AMPLIFIER

The logarithmic amplifier consists primarily of a linear integrated circuit operational amplifier IC1 and feedback transistor Q1. The output of the operational amplifier is adjusted by the balance control such that the base-emitter junction is forward biased. The short circuit I_C versus V_{EB} transfer characteristics of the logging transistor is accurately logarithmic over a large dynamic range. In this configuration, the output is a logarithmic function of the input RF signal.

2.5 FIXED GAIN AMPLIFIER

The output signal from the logging amplifier is small and hence is amplified with another integrated circuit operational amplifier IC2. An offset control is provided to establish a zero DC output from the unit with no input signal.

2.6 POWER SUPPLY

The power supply consists of two 9V inexpensive transistor radio type batteries. With the small current drain, the LN-40 should operate approximately 50 hours with only minor adjustments of the balance and offset controls. Two capacitors, C_1 and C_2 , are provided for decoupling as the batteries age.

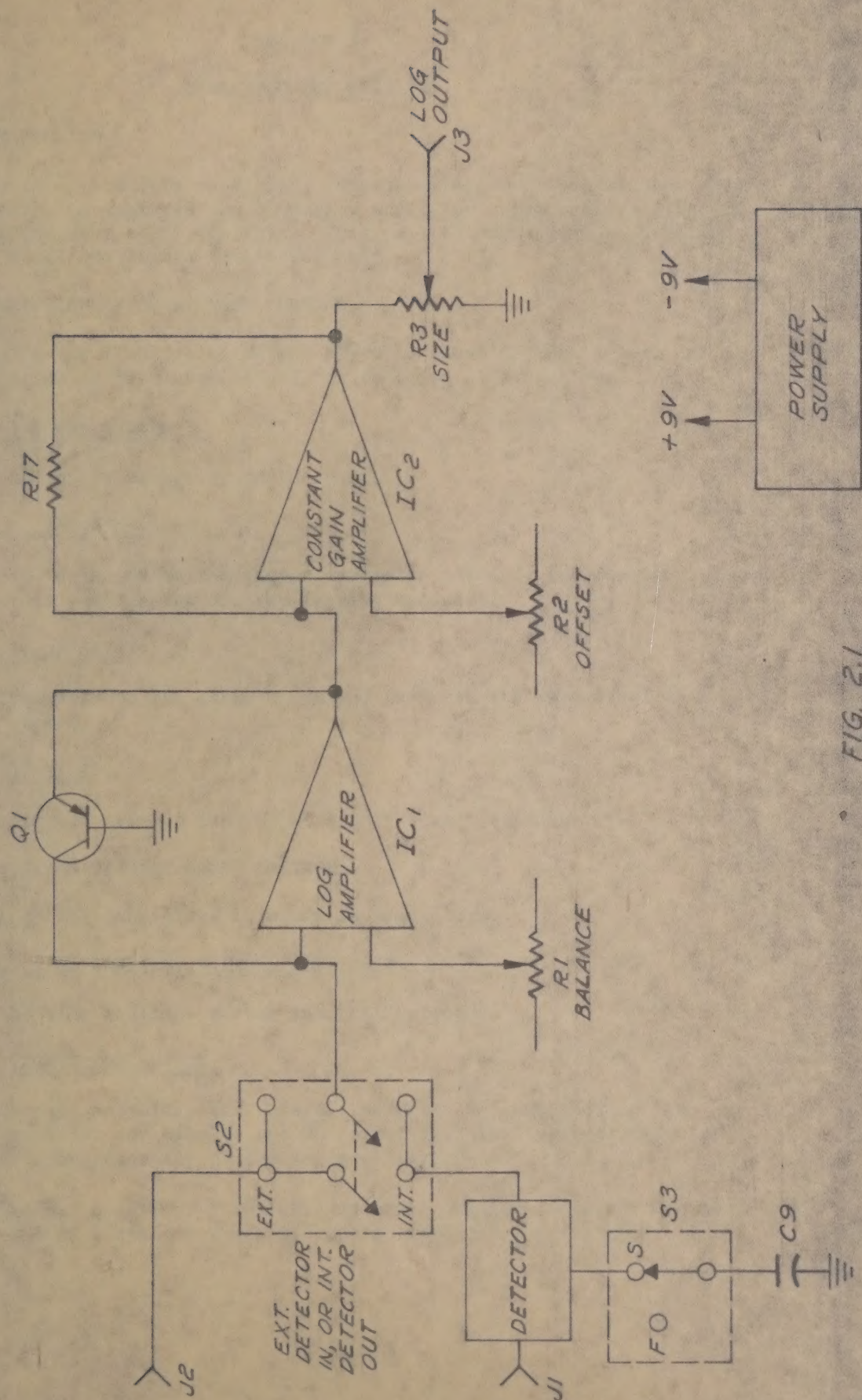


FIG. 2.1

SECTION 3

OPERATING INSTRUCTIONS

3.1 INTRODUCTION

The LN-40 is a versatile instrument incorporating many innovations. Most of its operating features can be easily understood from a description of the front and rear panel controls. This unit is supplied for operation from two 9 volt batteries (included) only.

3.2 DESCRIPTION OF FRONT PANEL CONTROLS

A drawing of the front panel of the LN-40 is shown in figure 3-1. An identification of each control and its function is as follows:

3.2.1 POWER SWITCH

Switches on the 9V batteries to the unit.

3.2.2 BALANCE

This control establishes the proper operating point of the logging transistor to provide the desired logging response.

3.2.3. OFFSET

This control adjusts the output from the LN-40 to the zero level with no input signal.

3.2.4. SIZE

Varies amplitude only of the output signal from the LN-40.

3.3 DESCRIPTION OF BACK PANEL CONTROLS

A drawing of the back panel is shown in figure 3.2.

3.3.1 TIME CONSTANT SWITCH SLOW-FAST

Selects the time constant of the internal detector.

3.3.2 DETECTOR SWITCH

In the internal position, the internal detector is connected to the logging amplifier and also to the DC connector. The internal detector can be used independently of the log amplifier.

In the external position, a suitable external negative detector can be fed into the DC connector which is coupled into the log amplifier.

3.3.3 RF CONNECTOR

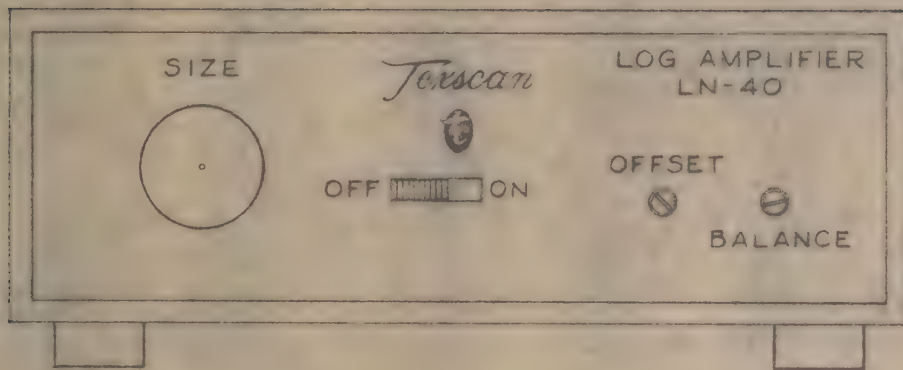
Input to detector.

3.3.4 DC CONNECTOR

Provides DC output of internal detector or depending on detector switch position, also DC input from an external detector.

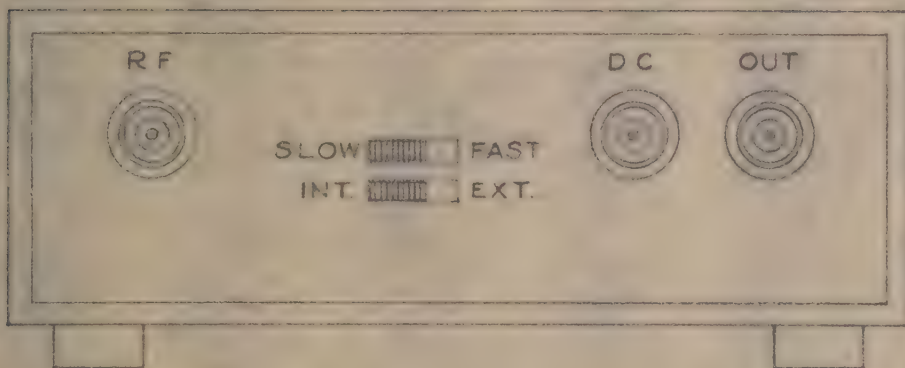
3.3.5 OUTPUT

Log output of the unit.



FRONT VIEW

FIGURE 3.1



REAR VIEW

FIGURE 3.2

SECTION 4

ADJUSTMENT PROCEDURE

4.1 INTRODUCTION

The adjustments and test of this instrument can be accomplished with the following auxiliary test equipment: (1) an oscilloscope such as HP130C, and (2) a sweep generator such as a Texscan VS-80.

4.2 INTERNAL ADJUSTMENTS

There are no internal adjustments in this unit.

The only adjustments necessary are the balance and offset control on the front panel.

4.3. EXPLANATION

With the sweep generator connected to an oscilloscope in the normal way, the RF output from the sweep generator is connected to RF connector of the LN-40. The output of the LN-40 is connected to the scope vertical. With the power switch on and 0.5 Vrms signal being fed into the detector from the sweeper, and the size control fully clockwise, a 5 V rectangular pattern should be observed. If this value is 10 V or more, adjust the balance control until the base line pulls up to form the 5 Volt rectangular pattern. Switch in 40 db on the sweep generator in 10 db steps and at the 40 db step, an output rectangular pattern should still be present on the scope although small. Minor adjustment may be required to achieve the desired 40 db dynamic range. Once this adjustment is made, remove the RF signal from the detector and set the offset control for zero DC output from the LN-40..

This is all the adjustments necessary for operation of the LN-40. Minor adjustments may be necessary from time to time as the batteries age, however, once familiar with the unit, the adjustments should only take seconds. The use of an external detector may require rebalancing of the unit.

SECTION 5

MAINTENANCE

5.1 INTRODUCTION

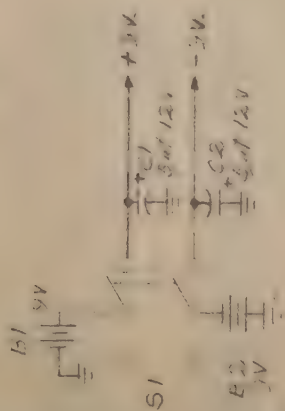
As in trouble shooting any electronic equipment, the best approach is to systematically attempt to isolate the problem to a particular circuit, and then a component by a process of elimination. Before attempting to find any failure, it is suggested that the trouble shooting technician or engineer become familiar with the equipment by reading Section 2 and 3 of this manual. The following section, Section 5.2, presents a trouble shooting chart which lists some of the more common failures. A VTVM, an oscilloscope, and a sweep generator should be sufficient tools in testing the unit.

5.1.1 Battery replacement

The batteries can easily be replaced by removing the four rubber feet on the bottom of the LN-40 and sliding the unit out of the case. The batteries are very accessible. No difficulty should be encountered in replacing them since the contacts are polarized.

5.2 TROUBLE SHOOTING CHART

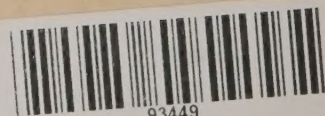
<u>SYMPTOM</u>	<u>CHECK</u>
The balance potentiometer will not provide proper adjustment of the logging stage.	Batteries
The offset control will not set the output to zero.	Batteries
No output with RF input.	CR1 IC1, IC2, Q1



MAT'L:	SPECIFICATIONS			
FINISH:	DECIMAL DIMENSIONS TO BE $\pm .005$ FRACTIONAL DIMENSIONS TO BE $\pm \frac{1}{64}$ DRILL, PUNCH, AND COMMERCIAL STOCK SIZES DO NOT APPLY			
TEXSCAN CORPORATION INDIANAPOLIS, INDIANA		SCALE DRAWN BY APP'D. BY		DATE
FINAL ASSY-SCHEMATIC LOG AMP. LN-40		SHEET 9 OF 4		A-200-230
DO NOT SCALE THIS PRINT				

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION	MFG., MFG. PART NO.
B1	009-003	Battery - 9 V	Burgess 2U6
B2	009-003	Battery - 9 V	Burgess 2U6
C1	012-115	Capacitor, 5uf, 12V	Sprague, TL 1127
C2	012-115	Capacitor, 5uf, 12V	Sprague, TL 1127
C3	012-084	Capacitor, 33pf	RMC 33NPO
C4	012-013	Capacitor, 120pf	RMC 120NPO
C5	012-083	Capacitor, 12pf	RMC 12NPO
C6	012-084	Capacitor, 33pf	RMC 33NPO
C7	012-013	Capacitor, 120pf	RMC 120NPO
C8	012-103	Capacitor, 15pf	RMC 15NPO
C9	012-009	Capacitor, 1000pf	RMC SM.001
C10	012-148	Capacitor, 120pf	Allen Bradley FW5N-121-W
CR1	025-001	Diode, 1N82	Texscan Corporation
IC1	062-027	Transistor, UA709C	Fairchild UA709C
IC2	062-027	Transistor, UA709C	Fairchild UA709C
J1	020-011	Connector, RF, UG625/U	Startronics UG625/U
J2	020-011	Connector, RF, UG625/U	Startronics UG625/U
J3	020-011	Connector, RF, UG625/U	Startronics UG625/U
Q1	062-026	Transistor, 2N3640	Fairchild 2N3640
R1	048-091	Resistor, Variable, 5K	Amphenol 2600 Series
R2	048-092	Resistor, Variable, 20K	Amphenol 2600 Series
R3	048-093	Resistor, Variable, 50K	CTS
R4	045-696	Resistor, Fixed, 470ohm, $\frac{1}{2}W, \pm 10\%$	Allen Bradley
R5	045-696	Resistor, Fixed, 470ohm, $\frac{1}{2}W, \pm 10\%$	Allen Bradley
R6	045-759	Resistor, Fixed, 15Kohm, $\frac{1}{2}W, \pm 10\%$	Allen Bradley
R7	045-808	Resistor, Fixed, 220Kohm, $\frac{1}{2}W, \pm 10\%$	Allen Bradley
R8	045-756	Resistor, Fixed, 12Kohm, $\frac{1}{2}W, \pm 10\%$	Allen Bradley

CIRCUIT REF. NO.	TEXSCAN PART NO.	DESCRIPTION	MFG., MFG. PART NO.
R9	045-742	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R10	045-759	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R11	045-700	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R12	045-791	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R13	045-752	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R14	045-721	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R15	045-759	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R16	045-749	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R17	045-780	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R18	045-682	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R19	045-752	Resistor, Fixed, $\frac{1}{2}W$, $\pm 10\%$	Allen Bradley
R20	047-009	Resistor, Fixed, $\frac{1}{2}W$, $\pm 1\%$	IRC
S1	057-031	Switch, DPDT Slide	Continental Wirt
S2	057-031	Switch, DPDT Slide	Continental Wirt
S3	057-031	Switch, DPDT Slide	Continental Wirt
	029-004	Foot	Texscan Corporation



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